RULLI, A., dotsent (Tartu, Estonskoy SSSR, ul. Terakuet, d.22)

Changes in the pulse rate in relation to bilateral vagotomy in the thoracic cavity. Vest.khir. 83 no.9:70-74 S '59. (MIRA 13:2)

1. Iz kafedry fakul'tetskoy khirurgii Tartuskogo universiteta.
(VAGOTOMY, effects)
(PULSE)

VELLER, V.N., doktor tekhn.nauk; KIRAKOSYANTS, G.A., kand.tekhn.nauk;
LAPUZIN, V.S., inzh.; LEVIN, D.M., inzh.; ROZHANSKIY, V.Ye., inzh.;
RULLIT, R.A., inzh.; FRIDMAN, A.Ye., inzh.

Water system for the regulation of the K-150-130 turbine developed by the Kharkov Turbo-Generator Plant. Teploenergetika 9 no.11:10-17 N '62. (MIRA 15:10)

1. Vsesoyuznyy nauchno-issledovatel'skiy teplotekhnicheskiy institut i Khar'kovskiy turbogenertornyy zavod.
(Kharkov—Steam turbines) (Hydraulic servomechanisms)

KLURFEL'D, A.I., inzh.; KORNEYKO, V.N., inzh.; RULLIT, R.A., inzh.;
SAMORODSKIY, L.F., inzh.; FRIDMAN, A.Ye., inzh.; SHCHERBINA,
S.A., inzh.

Control system of a PVK-150 turbine and some special features of its adjustment. Teploenergetika 11 no. 1:67-72 Ja '64.
(MIRA 17:5)

1. Khar'kovskiy turbinnyy zavod im. S.M.Kirova.

RULNEV

AID P - 3692

Subject : USSR/Aeronautics

Card 1/1 Pub. 135 - 19/22

Author : Not given

Title : New books on aviation

Periodical : Vest. vozd. flota, 1, 87-89, Ja 1956

Abstract : 1. Kazandzhan, P. K., and others Teorya reaktivnykh dvigateley (Jet engine theory) Moscow 1955, 2. Rulneva, Ye. M., Hero of the Soviet Union. Poka stuchit serdtse (As long as the heart beats), a collection of various papers and diaries of the author, a well known Russian woman pilot and commander in the Air Force.

Institution : None

Submitted : No date

[illegible], Mihajlo, dr.; MILUJEVIC, Juraj, dr.

Acute respiratory insufficiency and tracheotomy. Lijecn. vjesn. 87 no.6:639-649 Je '65.

1. Iz Bolnice za zarazne bolesti i Otorinolaringoloske klinike Medicinskog fakulteta u Zagrebu.

FALISEVAC, Josip; RUINJEVIC, Juraj; BREITENFELD, Josip

Clinical considerations on tick-borne meningoencephalitis in Croatia. Zdrav. vestn. 33 no.10:259-262 '64

1. Klinika za zarazne bolesti, Zagreb.

FALISEVAC, Josip, dr.; RULNJEVIC, Juraj, dr.; BEZJAK, Branko, dr.;
HELLENBACH, Helena, dr.; BREITENFELD, Josip, dr.

Clinical considerations on tick-borne meningoencephalitis.
Lijecn. vjesn. 86 no.1:25-34 Ja'64

1. Iz Bolnice za zarazne bolesti u Zagrebu.

S

RULNJEVIC, Juraj, Dr.; SVARA, Vesna, Dr.

Modern therapy of respiratory insufficiency in botulism. Lijec vjes 82 no.9/10:917-924 '60.

1. Iz Bolnice za zarazne bolesti u Zagrebu
(BOTULISM compl)
(RESPIRATORY SYSTEM dis)

RULNJEVIC, Juraj, dr.; KOSUTIC, Zvonimir, dr.

Recent progress in the treatment of tetanus. Lijecn. vjesn. 83 no.2:142-149 '61.

1. Iz Bolnice za zarazne bolesti u Zagrebu.
(TETANUS ther)

FALISEVAC, Josip, dr.; RULNJEVIC, Juraj, dr.; HIRTZLER, Raoul, dr.

Epidemic of poliomyelitis in Croatia in 1960. Lijecn. vjesn. 83 no.6:567-585 '61.

1. Iz Bolnice za zarazne bolesti u Zagrebu i Zavoda za opcu patologiju i patolowku anatomiju Medicinskog fakultata Sveucilista u Zagrebu.

(POLIOMYELITIS epidemiol)

RUL'NOVA, A.Z.

More precise mathematical model of roasting a molybdenum concentrate in a fluidized bed. Sbor. nauch. trud. Gintsvetmeta no.21:158-167 '64. (MIRA 18:8)

D'YACH[illegible] [illegible], RUL'NOVA, A.Z.

More precise mathematical model of roasting sulfur pyrite in a fluidized bed. Sbor. nauch. trud. Gintsvetmeta no.21:168-178 '64. (MIRA 18:8)

RUL'YE, K.F.; DAVITASHVILI, L.Sh.; MIKULINSKIY, S.R.; PETROVSKIY, I.G., akademik, redaktor; ANDREYEV, N.N., akademik, redaktor; BYKOV, K.M., akademik, redaktor; KAZANSKIY, B.A., akademik, redaktor; OPARIN, A.I., akademik, redaktor; SHMIDT, O.Yu., akademik, redaktor; SHCHERBAKOV, D.I., akademik, redaktor; YUDIN, P.F., akademik, redaktor; KOSHTOYANTS, Kh.S., redaktor; SAMARIN, A.M., redaktor; MAKSIMOV, A.A., redaktor; LEBEDEV, D.M., doktor geograficheskikh nauk, redaktor; FIGUROVSKIY, N.A., doktor khimicheskikh nauk, redaktor; KUZNETSOV, I.V., kandidat filosofskikh nauk, redaktor; OZNOBISHIN, D.V., kandidat istoricheskikh nauk, redaktor;

[Selected biological works] Izbrannye biologicheskie proizvedeniia. Redaktsiia, stat'ia i kommentarii L.Sh.Davitashvili i S.R.Mikulinskogo. Moskva, Izd-vo Akademii nauk SSSR. 1954. (MLRA 7:8)

1. Chlen-korrespondent AN SSSR (for Koshtoyants, Samarin, Maksimov) (Biology)

RUL'YE, K.F.

GAYSINOVICH, A.Ye., kandidat biologicheskikh nauk.

First edition of the works of C.Roillier ("Selected writings on biology." K.F.Rul'e. Reviewed by A.E.Gaisinovich). Vest. AN SSSR 24 no.27:119-123 Jl '54. (MLRA 7:8)
(Rouillier, Charles, 1814-1858) (Biology)

RUL'YE, Karl Frantsovich.

Izbrannyye Biologicheskiye Proizvedeniya [Selected Biological Works, Ed. By] L. Sh. Davitashvili I S. R. Mikulinskiy. Moskva, Izd-vo Akademii Nauk SSSR, 1954. 688 p. Illus., Diagrs., Ports.

N/5
631
.R9

ZUBOV, V.P.; RUL'YE, K.F.

Unknown article of K.F.Rul'e. Trudy Inst.ist.est. 4:450-451 '52.
(MLRA 6:7)
(Rul'e, K.F., 1814-1858)

PULYAV, I. N.

29046

V Bor'ye Za Dosrochnoye Vypolnyeniye Pyatilyetki (Na Zavodakh Glavtorfmasha).
Torf. Prom-st', 1949, No. 9, C. 4-6.

SO: LETOPIS' No. 34

L 14575-66

ACC NR: AP6002276 SOURCE CODE: UR/0412/65/000/011/0017/0017

(A) 21/

AUTHOR: Rum, L. (Deputy chief)

ORG: Kuznetsovskiy DSK

TITLE: A prefabricated sanitary-engineering cabin

SOURCE: Na stroykakh [Rossii], no. 11, 1965, 17

TOPIC TAGS: sanitary engineering, sanitation, structure panel, general construction

ABSTRACT: The Kuznetsovskiy House Building Combine, Leningrad (Kuznetsovskiy domostroitel'nyy kombinat) has organized the production of sanitary engineering cabins (prefabricated toilet booths) made of flat reinforced-concrete panels, bolted together to prevent warping of the framework and the cracking of the concrete, and to provide water-tightness of the joints. Particular attention is paid to the factory finish of the product; the booth requires only surface finishing when assembled at the site. The floor of the cabin is made of plastics, molded to the bottom slab. A cabin is produced every 40 minutes. Each cabin requires 43.61 kg of metal, 0.98 cubic meters of concrete, 22.3 man-hours of labor, and costs 125 rubles 32 kopeks. Rated output is 600 units per month. The shop is now operating on a 3-shift schedule and is

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L 14575-66

ACC NR: AP6002276

0

producing 500 units per month. The factory finish of the product decreases by 2.07 man-hours the labor required for assembly at the site. Orig. art. has: 2 figures.

SUB CODE: 13 / SUBM DATE: none

FW

Card 2/2

BARDIN, I.P.[deceased]; VAVLOV, N.S.(Moskva); GESS-DE-KAL'VE, B.A. (Moskva); DIYEV, V.Ye.(Moskva); YEMEL'YANOV, V.I.(Moskva); KANAVETS, P.I.(Moskva); MELENT'YEV, P.N.(Moskva); RUMAKINA, M.A. (Moskva); TSYLEV, L.M.(Moskva).

Reduction roasting of iron in ore-fuel granules in a fludized bed with fountain effect. Izv. AN SSSR. Otd.tekh.nauk. Met.i topl. no.5:13-18 S-O '60. (MIRA 13:11)
(Ore dressing) (Fluidization)

L 17161-65 EWT(m)/EWA(d)/EPR/EWP(t)/EWP(b) Ps-4 IJP(c)/ASD(m)-3/SSD/
AFWL/AFETR MJW/JD/MLK
ACCESSION NR: AT4048079 S/0000/64/000/000/0240/0242

AUTHOR: Pul'tsin, N.M.; Rumako, M.P.; Pokrovskaya, V.B. B//

TITLE: The heat resistance of titanium alloy AT8 during short-term tests
14 27 14

SOURCE: Soveshchaniye po metallurgii, metallovedeniyu i primeneniyu titana i yego splavov. 5th, Moscow, 1963. Metallovedeniye titana (Metallography of titanium); trudy* soveshchaniya. Moscow, Izd-vo Nauka, 1964, 240-242

TOPIC TAGS: titanium alloy, creep, heat resistance, strength, oxidation, titanium aluminum alloy, AT8 alloy 14

ABSTRACT: In order to study the mechanical properties of AT8 alloy in relation to those of pure titanium and other titanium alloys, rectangular samples 2.7 mm thick, 10 mm wide, and 140 mm long, were placed in holders suspended in pendular fashion and heated by single-coil induction heaters fed with a high-frequency electric current. The temperature to which the samples were heated was measured by an optical pyrometer to an accuracy of ±10C. Experiments were carried out at temperatures of 800, 850, and 900C and stresses of 3–20 kg/mm^2. After each sample had been brought to the prescribed temperature, it was held there until it was fractured, the time necessary to effect fracture being noted; the samples were then subjected to microscopic analysis. In agreement

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L 17161-65

ACCESSION NR: AT4048079

2

with the data of previous experiments, the results show that a decrease in stress increased the time to rupture at constant temperature, while an increase in temperature at constant stress decreased the time to rupture. The rupture strength for a rupture life of 10 min was 5.5, 4.0, and 2 kg/mm^2 at 800, 850, and 900C, respectively. The total creep of the samples was similar at different temperatures, but was achieved much more rapidly at higher temperatures (20, 50, and 120 sec for comparable elongations at 880, 850, and 800C). Microscopic analysis of areas of greatest deformation, i.e., areas where the necking occurred, showed signs of striation and loosening of the material. There was no significant scale formation during the tests, due probably to the high Al content of At8 alloy. Since the experiments were conducted at temperatures far above the working temperature of AT8 and other titanium alloys, the data obtained may be used to predict the behavior of AT8 alloy in short-time operation at high temperatures. "The samples of alloy were prepared by I. I. Kornilov and V. S. Mikheyev." Orig. art. has: 2 figures and 1 table.

ASSOCIATION: none

SUBMITTED: 15Jul64 ENCL: 00 SUB CODE: MM

NO REF SOV: 000 OTHER: 000 ATD PRESS: 3149

Card 2/2

RUMAKO, Ye.

What hinders the proper organization of payments. Fin.SSSR 18 no.7:32-34 Jl '57. (MIRA 10:7)

1. Zamestitel' upravlyayushchego Chkalovskoy oblastnoy kontoroy Prombanka.

(Payment)

1. RUMAKOV, F. A.

2. USSR (600)

4. Lumbering

7. Over-all mechanization at the Lubovitskiy logging camp, Les. prom., 13, no. 5, 1953.

9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

RUMAKOV, Fedor Aleksandrovich; NOVOSEL'TSEV, N.V., red.; GORYUNOVA, L.K., red.izd-va; BACHURINA, A.M., tekhn.red.

[Over-all mechanization in the Dubovitsa lumber camp]
Kompleksnaia mekhanizatsiia v Dubovitskom lespromkhoze.
Moskva, Goslesbumizdat, 1958. 49 p. (MIRA 12:6)
(Tosno District--Lumbering--Machinery)

RUMANEK, K.

Sawdust combustion in industrial boilers. Drevo 18 no.4: 168 Ap '63.

PUZAKOV, N.A., doktor tekhn. nauk; KHARKHUTA, N.Ya., doktor tekhn. nauk; MOTYLEV, Yu.L., kand. tekhn. nauk; VEYTSMAN, M.I., kand. tekhn. nauk; MITASOV, I V., inzh.; LEVITSKIY, Ye.F., inzh.; RUMANOV, A.Z., inzh.; Prinimali uchastiye: KAZARNOVSKIY, V.D., kand. tekhn. nauk; DENISOV, Ye.M., inzh.; TOPOL'NITSKAYA, L.P., red.

[Instruction for building earth automobile roadbeds] Instruktsiia po sooruzheniiu zemlianogo polotna avtomobil'nykh dorog (VSN 97-63). Moskva, Transport, 1964. 238 p. (MIRA 17:11)

1. Russia (1923- U.S.S.R.) Gosudarstvennyy proizvodstvennyy komitet po transportnomu stroitel'stvu.

ZASOV, I.A., kandidat tekhnicheskikh nauk; PIKOVSKIY, Ya.M., kandidat tekhnicheskikh nauk; RUMANOV, A.Z., redaktor; PETROVSKAYA, Ye., tekhnicheskiy redaktor

[Asphalt concrete plants in cities; data for their design] Gorodskie asfal'tobetonnye zavody; materialy po proektirovaniiu. Moskva, Izd-vo Ministerstva kommunal'nogo khoziaistva RSFSR, 1953. 103 p. [Microfilm] (MLRA 7:10)
(Asphalt concrete)

RUMANOV, A.Z.

GUREVICH, S.L., inzhener; RUMANOV, A.Z., inzhener.

Use of a soil-throwing machine for the mechanization of backfilling work. Elek.sta. 25 no. 8:26-30 Ag '54. (MLRA 7:9)
(Excavating machinery)

Rumanov, A. Z.

AID P - 3520

Subject : USSR/Power Eng

Card 1/1 Pub. 26 - 14/30

Authors : Motskin, Ya. M. and A. Z. Rumanov, Engs.

Title : Mounting of large reinforced concrete wall slabs

Periodical : Elek. sta., 9, 44-48, S 1955

Abstract : The article describes the construction of a powerhouse using reinforced concrete slabs instead of bricas. The details of frame welding and the process of slab mounting are given. Nine diagrams.

Institution : None

Submitted : No date

KUZOVKOV, M.M., inzh.; RUMANOV, A.Z., inzh.

Installation for pumping asphalt into transporting vehicles.
Avt. dor. 22 no.9:28 S '59. (MIRA 12:12)
(Pumping machinery)

(N) L 10938-66 EWT(d)/EWT(l)/EWT(m)/EEC(k)-2/EWP(v)/T/EWP(t)/EWP(k)/EWP(h)
ACC NR: AP6002529 EWP(l)/EWA(h)/ SOURCE CODE: UR/0286/65/000/023/0035/0035
EWA(c) JD/HM

41
B

INVENTOR: Rudman, M. D.; Rumanov, B. A.

ORG: none

TITLE: Electric power meter. 25 Class 21, No. 176643 [announced by Kuybyshev Aviation Institute (Kuybyshevskiy aviatsionnyy institut)]

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 23, 1965, 35

TOPIC TAGS: welding, metal welding, resistance welding, spot welding, electric, power meter

ABSTRACT: This Author Certificate introduces a device for measuring electric power 14 input at the electrodes in resistance spot welding. The device consists of a current sensor, a voltage sensor, a computing element, and an integrator. It incorporates a two-loop servosystem, with the computing element, essentially a linear rotary transformer, electrically connected with the servosystem and the voltage sensor. [MS]

SUB CODE: 13, 09/ SUBM DATE: 27Jul64/ ATD PRESS: 4172

UDC: 621.791.763
621.317.385.002.54

Card 1/1

L 31092-65
ACCESSION NR: AP5004977 S/0286/65/000/002/0083/0083

11
B

AUTHOR: Rumanov, B. A.

TITLE: A device for measuring the curvature of a moving detail in the process of bending rolling. Class 49, No. 167738

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 2, 1965, 83

TOPIC TAGS: measuring instrument, curved profile, bending, rolling mill, roll-meter, bearing, measurement accuracy

ABSTRACT: This Author Certificate presents a device for measuring the curvature of a moving detail in the process [illegible]. The device contains two [illegible] which is [illegible] kinematic bearing in contact with the [illegible] sensitivity in measuring [illegible] the kinematic [illegible]
[illegible]

SUBMITTED: 11Oct63 ENCL: 00 SUB CODE: IE

NO REF SOV: 000 OTHER: 000

Card 1/1

RAVVA, Zh.S.; RUMANOV, B.A.

Program controlled engraving. Stan. i instr. 36 no.4:16-17 Ap '65.
(MIRA 18:5)

RUMANOV, Boris Arkad'yevich; PETROPOL'SKAYA, N.Ye., red.

[Program control of rolling and bending mills] Programmmoe upravlenie prokatno-gibochnymi stankami. [Kuibyshev] Kuibushevskoe knizhnoe izd-vo, 1965. 61 p. (MIRA 18:11)

L 35928-66 EWT(d)/EWT(m)/EWP(v)/T/EWP(t)/ETI/EWP(k)/EWP(h)/EWP(l) IJP(c)

ACC NR: AP6015108 JH/BC/JD/ (N) HM SOURCE CODE: UR/0135/66/000/005/0037/0037

AUTHOR: Rudman, M. D. (Engineer); Rumanov, B. A. (Engineer); Ivashin, A. S. (Engineer)

ORG: Kuybyshev Aviation Institute (Kuybyshevskiy aviatsionnyy institut)

TITLE: Automatic control device for spot welding light-weight alloys

SOURCE: Svarochnoye proizvodstvo, no. 5, 1966, 37

TOPIC TAGS: welding equipment, control circuit, electronic signal

ABSTRACT: The device (model AKS-3) signals deviations from electrode pressure, current value, duration of the weld time within the ranges allowable for the MTIP and MTPT welding machines within the following limits: electrode pressure--±10%, current value--±5%, weld time--±0.001 sec. Electrode pressure is measured by an electrocontact pick-up. The contacts of the pickup are attached to the grid circuit of the electronic relay which measures deviations from set limits for the electrode pressure. Deviations are indicated by signal lights on the control panel. The welding current control unit signals deviations from the desired amplitude of the weld current. A magnetic amplifier is used as a null indicator of the second harmonic. The measured signal is obtained from the terminals off a shunt in the main circuit of the welding transformer and goes to the control winding of the magnetic amplifier. A signal is al-

UDC: 621.791.763.037

Card 1/2

L 35928-66

ACC NR: AP6015108

so transmitted to the support amplifier winding from the dc power source. Signal magnitude is controlled by a potentiometer and milliammeter. The ac magnetic amplifier windings are supplied with power from the unit generator. The flows created by the balance and support windings are directed against each other. If the total flow is zero the electromotive power of the second output harmonic is also zero. This moment is fixed by an electronic circuit consisting of an amplifier and electromagnetic relay. Deviations are indicated by signal lights on the control panel. The control unit for welding current duration consists of a starter circuit, a pulse counter, and a coincidence circuit. The pulse counter is activated by a commutator. The coincidence circuit indicates current duration limits. A block diagram of the AKS-3 is given. Orig. art. has: 1 figure.

SUB CODE: 13,09/ SUBM DATE: none

Card 2/2

L 22181-65 EWA(k)/EWT(l)/EWT(m)/EEC(t)/EWP(b)/T/EWP(t) ASDA-5/AFWL/SSD/BSD/
ASMP-2/APGC(b)/ESDG(s) JD

ACCESSION NR: AP5001843 S/0056/64/047/006/2207/2212

AUTHOR: Rumanov, E. M.

B

TITLE: Absorption of x rays in metals 4

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 6, 1964, 2207-2212

TOPIC TAGS: x ray absorption, photoelectron, electron electron interaction, bound state, absorption edge, absorption spectrum

ABSTRACT: The effect of the interelectron interaction on the absorption of x rays by a metal is evaluated by means of an approximate perturbation-theoretic approach, in which account is first taken of the collisions between the photoelectrons and the Fermi-level electrons that cause the damping of the electron. The contribution of the processes at which two or more photoelectrons or other excitations are produced, and the influence of the interaction between the photoelectron and the hole in the ionized-atom shell, are then evaluated. The absorption coefficient is determined by first establishing its connection with the polarization

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L 22181-65

ACCESSION NR: AP5001843

4

operator in the crystal, after which corrections to the expression for the interband transition are evaluated for a simple model of the metal, in which there are only two bands - the internal level and the "conduction band" in which the energy assumes positive values. It is shown that bound states of electrons and holes are impossible. The spectrum near the absorption edge is also determined. "The author thanks L. V. Keldy*sh under whose guidance the work was done, Professor V. L. Ginzburg for interest, and L. K. Izraileva for useful advice and discussions." Orig. art. has: 2 figures and 17 formulas.

ASSOCIATION: Institut fiziki Sibirskogo otdeleniya Akademii nauk SSSR (Institute of Physics, Siberian Department, Academy of Sciences SSSR).

SUBMITTED: 08Jun64 ENCL: 00

SUB CODE: NP, MM NR REF SOV: 004 OTHER: 000

Card 2/2

RODICHEV, A.M.; RUMANOV, E.N.

Theory of the magnetic reversal of thin ferromagnetic films in strong fields. Izv. AN SSSR. Ser. fiz. 26 no.2:296-299 F '62. (MIRA 15:2)

(Ferromagnetism)
(Magnetic fields)

20027

S/070/61/006/001/009/011
E032/E314

9,2181 (2303,1144)
24,7800 (1136,1142,1385)

AUTHORS: Rumanov, E.N. and Fesenko, Ye.G.

TITLE: Exchange Model of a Ferro-electric

PERIODICAL: Kristallografiya, 1961, Vol. 6, No. 1, pp. 139 - 140

TEXT: In studying the mechanism responsible for the ferro-electric properties of barium titanate and other ferro-electrics having a perovskite-type structure it is usually assumed that these materials can be looked upon as ionic crystals. On the other hand, X-ray and infra-red studies have shown that these ferro-electrics, in fact, occupy an intermediate position between valence and ionic crystals. The present authors have investigated the exchange interaction as a possible cause of ferro-electric behaviour. Following Megan (Ref. 8) they considered an atomic plane made up of positive ions A and negative ions B. The A ions form a square net and the B ions are located at mid-points of the squares in the net (this corresponds to the 200 plane in perovskites). It is assumed that the outer electrons in

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S/070/61/006/001/009/011
E032/E314

Exchange Model ....

the A ions are in s-states while in the case of the B ions they are in the p-states. The energy of the exchange interaction between a B ion and two neighbouring A ions is a minimum if the A-B points are at $\pi/2$ (J. Van Vleck, A. Sherma - Ref. 11). When the A atom is displaced from the plane the exchange interaction energy is reduced. For small displacements (x) the exchange energy per A-ion can be approximately represented by:

$$u = - Ka^{*}x \qquad (1)$$

where $a^{*} = 1/AA$ is the reciprocal lattice parameter and

$K (> 0)$ is a constant.

If of the total number of A ions nearest to the A ion under consideration, n_+ ions are displaced in the same direction as the given ion while n_- are displaced in the

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Exchange Model .....

opposite direction, then the exchange energy per A ion can be written down in the form

$$u_1 = - Ka^{\times}x(n_+ - n_-) \qquad (2).$$

It is assumed that for an ion $A_{\ell_1 \ell_2}$

$$(n_+)_{l_1 l_2} \sim \exp\left\{\frac{Ka^{\times}}{kT} \sum_{\substack{i=l_1\delta_{k,l_2\pm 1},\ (l_1\pm 1)\delta_{k,l_2} \\ k=l_2\delta_{i,l_1\pm 1},\ (l_2\pm 1)\delta_{i,l_1}}} x_{ik}(n_+ - n_-)_{ik}\right\}, \qquad (3)$$

$$(n_-)_{l_1 l_2} \sim \exp\left\{\frac{Ka^{\times}}{kT} \sum_{\substack{i=l_1\delta_{k,l_2\pm 1},\ (l_1\pm 1)\delta_{k,l_2} \\ k=l_2\delta_{i,l_1\pm 1},\ (l_2\pm 1)\delta_{i,l_1}}} x_{ik}(n_- - n_+)_{ik}\right\}. \qquad (3a)$$

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E032/E314

Exchange Model .....

Thus, although only exchange interactions between neighbouring atoms are taken into account, the exchange energy of each ion depends on the state of the system as a whole. The sum on the right-hand side of Eq. (3) can be replaced by an average displacement $\langle x \rangle$ and hence

$$n_+ - n_- = \text{th}\,\frac{Ka^x}{kT}\langle x\rangle \qquad (4).$$

In addition to the expression given by Eq. (2) the expression for the energy should contain the kinetic term and terms proportional to squares of the displacements of which only the term

$$u_2 = Cx^2$$

is important in the present context. Using this scheme,

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E032/E314

Exchange Model .....

one can obtain all the results of the thermodynamic theory near the Curie point, where

$$\text{th } y \approx y - y^3/3 \quad (y = Ka^{x} \langle x \rangle / kT) .$$

This includes the continuous reduction in the polarisation, the Curie-Weiss law, hysteresis, etc.
There are 12 references: 6 Soviet and 6 non-Soviet.

ASSOCIATION: Institut fiziki, Sibirskoye otdeleniye, AN SSSR
(Institute of Physics of the Siberian Department of the AS USSR)

SUBMITTED: April 7, 1960

Card 5/5

RUMANOV, E.N.

X-ray absorption in metals. Zhur.eksp. i teor.fiz. 47 no.6:2207-2212 D '64. (MIRA 18:2)

1. Institut fiziki Sibirskogo otdeleniya AN SSSR.

34177
S/048/62/026/002/026/032
B117/B138

24.2200 (1147, 1164, 1482)

AUTHORS: Rodichev, A. M., and Rumanov, E. N.

TITLE: Theory of magnetic reversal of thin ferromagnetic films in strong fields

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 2, 1962, 296-299

TEXT: This paper was presented at a conference on magnetism and antiferromagnetism. The limits of applicability of the uniform rotation pattern were analyzed on the basis of available experimental data. Simplified equations were suggested to describe magnetic reversal by uniform rotation:

$$\begin{cases} -(1/g)\dot{\eta} = A + \alpha\eta n_z M, \\ (1/g)\varphi = -\dot{\eta} n_z M + \alpha A \end{cases} \qquad (4)$$

$A = H_x \sin\varphi - \beta M \sin\varphi \cdot \cos\varphi + H_y \cos\varphi$; $\eta = \pi/2 - \theta$ are variables; α is a dimensionless relaxation constant; n_z is the demagnetizing factor in direction z; H_x and H_y are field components; β is the anisotropy constant.

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34177
S/048/62/026/002/026/032
B117/B138

Theory of magnetic reversal of...

With aperiodic motion where φ is always $\gg \eta$, (4) can be written in the form

$$\dot{\varphi} = (g/\alpha)(\dot{H}_x \sin\varphi - \beta M \sin\varphi \cdot \cos\varphi + H_y \cos\varphi) \qquad (5)$$

The magnetic reversal time τ can be calculated from

$$(1/\tau) = G(H_x - \beta M), \qquad (6)$$

$$G = (g/2\alpha) \cdot \left[1/\ln \cot (\varphi_0/2)\right]$$

IX

The formation and growth of domains of reverse magnetization observed (Ref. 8, see below) in fields of 1-3 oe mean that magnetic reversal takes place at low pulsed magnetic fields. In a two-dimensional system (film) magnetic reversal may be regarded as a phase transition from the metastable (magnetization against the field direction) to the equilibrium state (magnetization in the direction of field). The oppositely magnetized domains are nuclei of the stable phase. As the number of these nuclei increases an H_y-dependent correlation is observed. For the formation of nuclei in points y_1 and y_2 (the nuclei lie along axis x) this dependence can be expressed by $\Delta s(y_1)\,\Delta s(y_2) \sim \Delta s^2 \exp\,(2M^2/kT \cdot \Delta s^2 \varphi^2/r^3)$ (9). Δs is the surface of the nucleus; $\varphi = H_y(H_x + \beta M)$; $r = |y_1 - y_2|$ Of

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course, (9) only holds for $r \neq 0$. Increase in H_y, which increases the correlation, brings the magnetic reversal near to uniform rotation. In the case of the fields used in Ref. 7 (see below) magnetic reversal may be regarded as the "sum" of the uniform rotation and the shift of the domain boundaries. It may be assumed that rotational magnetic reversal begins a certain time τ' after the field H_x is switched on (τ' is the time required for rotation from the initial position to angle φ). During τ' the effect of rotation is low and magnetic reversal is caused by the movement of domain boundaries. The authors thank K. M. Polivanov, V. A. Ignatchenko and N. M. Salanskiy for discussions. There are 1 figure, 1 table, and 9 references: 3 Soviet and 6 non-Soviet. The three most recent references to the English-language publications read as follows: Dietrich W., Proebster W. E., Electr., 23, 79 (1960); Ref. 7. Hamphrey F. B. Gyorgy E. M., J. Appl. Phys., 80, 935 (1959);Ref. 8, Olson C.D., Pohm A.V., J. Appl. Phys., 29, 274 (1958).

Card 3/3

ROMANOVA, D.I., bibliograf; IVANEYEV, I.G., red.; BLINOV, A.I.,
tekhn.red.

[Technical education in the schools of Rostov Province] O politekhnicheskom obuchenii v shkolakh Rostovskoi oblasti; kratkii ukazatel' literatury. Rostov-na-Donu, 1957. 81 p.
(MIRA 13:4)

1. Rostov on the Don. Gosudarstvennaya nauchnaya biblioteka imeni K.Marksa.
(Rostov Province--Technical education)

RUMANOVA, I.M.

USSR

The crystalline structure of epidote $Ca_2Al_2FeSi_3O_{12}(OH)$.
N. V. Belov and I. M. Rumanova. *Doklady Akad. Nauk*
S.S.S.R. 89, 853~~-6(1953); cf. C.A.~~ 47, 963c, 6828f; 48,
13559c.—The crystal structure of epidote was studied.
Epidote is monoclinic with $a = 8.89$, $b = 5.63$, $c = 10.23$
kX, $\beta = 115° 24'$. The dark-green crystals of epidote were
found to contain ~16% Fe_2O_3 which corresponds to the
formula $Ca_2Al_2FeSi_3O_{12}(OH)$. Each cell contains 2 mols.

J. Rovtar Leach

4E

RUMANOVA, I. M.

The crystal structure of epidote. N. V. Belov and I. M. Rumanova. *Trudy Inst. Krist., Akad. Nauk S.S.S.R.* 9, [illegible]—Epidote, $Ca_2Al_2FeSi_3O_{12}(OH)$, is a representative of a group of minerals, each of which has a short period ~5.6 Å. The earlier works have given only the parameters of the cell and the space group of symmetry (cf. Gossner and Mussgnug, *C.A.* 26, 670; Bujor, *C.A.* 25, 6814; Gossner and Reichel, *C.A.* 27, 5270). A structure of epidote proposed by Ito (cf. *C.A.* 41, 5822e; 46, 9477f) was changed by him later (cf. *C.A.* 45, 6478c). But the structure, proposed by the last work, has some imperfections. The authors obtained new results; the parameters of the elementary cell are: $a = 8.80$ kX; $b = 5.63$ kX; $c = 10.23$ kX; $\beta = 115°24'$. The no. of mols. in a cell $z = 2$. The space group is holohedral C_{2h}^2-$P2_1/m$. The coördinates (×100) of the atoms of structure of epidote are: Al_I (0; 0; 0), Al_{II} (0; 0; 50), Fe (20.6; 25; 23.0), Ca_I (76.0; 75; 15.0), Ca_{II} (60.6; 75; 42.2), Si_I (33.8; 75; 4.8), Si_{II} (68.5; 25; 27.8), Si_{III} (18.5; 75; 31.8), O_I (23.3; 0; 4.2), O_{II} (30.9; 0; 35.8), O_{III} (80.0; 0; 33.6), O_{IV} (4.0; 25; 13.1), O_V (3.5; 75; 14.2), O_{VI} (7.0; 75; 41.5), O_{VII} (51.5; 75; 18.5), O_{VIII} (53.5; 25; 31.0), O_{IX} (62.8; 25; 10.0), OH (7.0; 25; 41.5). In the crystal structure there are Si tetrahedra, Al and Fe octahedra, and Ca polyhedra. The Al atoms have coördination no. 6. Epidote is a complex silicate with 2 types of radicals: diorthosilicate $[Si_2O_7]$ and orthosilicate $[SiO_4]$. One O atom and the OH group are not combined with a Si atom. Therefore the right formula of epidote is $Ca_2FeAl_2O(OH)[Si_2O_7][SiO_4]$. E. C. M.

RUMANOVA, I.M.

"Determination of indicators of Structural Amplitudes by means of Statistical Equations." by I.M. Rumanov. pp. 59-63.

SO: Works of the Inst of Crystallography, Issue #10, Reports submitted at the 3rd International Congress of Crystallography; published by the Acad Sci USSR, Moscow, 1954)

Rumanova, I. M.

USSR/Solid State Physics - Structural Crystallography, E-3

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 34590

Author: Rumanova, I. M.

Institution: None

Title: Statistical Determination of the Signs of the "Reference" Structural Amplitudes

Original Periodical: Dokl. AN SSSR, 1954, 98, No 3, 399-402

Abstract: Description of a method for determining the signs of the structural amplitudes of the brightest reflections (used as "references" for further operations in the determination of the signs of arbitrary reflections). The method is based on the statistical relationship $S_{H_A} = S(\overline{S_{H_i} S_{H_j}})$ (1), in which $H_A = H_i + H_j$ (S is the symbol for the sign of the structural amplitude, H_A, H_i, and H_j are arbitrary symbols for the indices $h_A k_A l_A$, h_i, k_i, l_i, and h_j, k_j, l_j). Equation (1) is applied to the 2 "compared" reflections H_A and H_B, expressed respectively in terms of the 2 groups that "determine" reflections H_i, H_j, $H_{i'}$, and $H_{j'}$. The latter are chosen to be "symmetrically coupled" reflections, the signs of which are related in a previously known

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USSR/Solid State Physics - Structural Crystallography, E-3

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 34590

Author: Rumanova, I. M.

Institution: None

Title: Statistical Determination of the Signs of the "Reference" Structural Amplitudes

Original Periodical: Dokl. AN SSSR, 1954, 98, No 3, 399-402

Abstract: manner. If, according to the symmetry conditions $|F_{hkl}| = F_{|h||k||l|}$, then $H_i = h_i k_i l_i$, $H_{i'} = \pm h_i \pm k_i \pm l_i$, $H_j = h_j k_j l_j$, $H_j = \pm h_j \pm k_j \pm l_j$, and consequently $h_A = h_i + h_j$, $h_B = \pm h_i \pm h_j$, etc. If, in particular, $|h_A| = |h_B|$, $|k_A| = |k_B|$, and $|l_A| \neq |l_B|$ the right halves of equation (1) will be formed by 2-dimensional sets of pairs of reflection (with specified l_i and l_j and with different $h_i k_i$ or $h_j k_j$); the statistics will be fully satisfactory for comparison of the signs of F_A and F_B. The statistical approach is also applicable to projections.

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SMIRNOVA,R.F.; RUMANOVA,I.M.; BELOV,N.V.

Crystallic structure of cuspidine.Zap.Vses.min.ob-va 84,no.2:
159-169 '55. (MIRA 8:10)

(Cuspidine)

RUMANOVA, I. M.

E-3

Category : USSR/Solid State Physics - Structural crystallography

Abs Jour : Ref Zhur - Fizika, No 1, 1957, No 1130

Author : Fesenko, Ye.G., Rumanova, I.M., Belov, N.V.
Title : Crystal Structure of Cyosite.

Orig Pub : Dokl. AN SSSR, 1955, 102, No 2, 275-278

Abstract : An x-ray diffraction study was made of cyosite $Ca_2Al_3Si_3O_{12}(OH)$: a 16.20, b 5.50, c 10.14 kX, Z = 4, Fedorov group D_{2h}^{16} -- Pnma. The structure was determined from the usual and generalized projections of the electron density on xz. The large number of F_{h0l} and F_{h1l} amplitudes determined in molybdenum radiation (407 and 277 respectively) make it possible to apply the statistical method to the determination of the signs. The single amplitudes were obtained from the relative ones taking into account the temperature correction at B = 0.7 kX^2. The reference group of signs was determined using a method previously described (Referat Zhurnal Fizika, 1956, 34590); this method made it possible to determine 21 signs of F_{h0l} and 218 F_{h1l}. The projections constructed from these data gave the approximate coordinates of almost all the atoms; they were used to determine the signs of all the amplitudes. The foundation of the structure is made up of single columns of Al-octahedra, which extend along the

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Category : USSR/Solid State Physics - Structural crystallography E-3

Abs Jour : Ref Zhur - Fizika, No 1, 1957, No 1130

b axis; adjacent to the columns are single octahedra, corresponding to the Fe-octahedra in epidote. The columns of octahedra are joined by ortho-groups (SiO_4), diortho-groups (Si_2O_7) and Ca- seven-cornered structures. The interatomic distances for Si -- O range from 1.53 to 1.70 kX, for O -- O (ribs of the tetrahedra) from 2.52 to 2.82, for Al -- O (in the octahedra comprising the columns) from 1.93 to 2.02, and for Al -- O (in the single octahedra) from 1.79 to 2.08 kX. The Si-O-Si valence angle is 162°.

Card : 1/1

SOV/70-3-6-3/25

AUTHOR: Rumanova, I.M.

TITLE: Usual and Small-circle Weighted Electron Density Projections with Initial Phase Angles (Obychnyye i poyasnyye vzveshennyye proyektsii elektronnoy plotnosti s nachal'noy fazoy)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 6, pp 664-675 (USSR)

ABSTRACT: Weighted phased projections of the type:

$$C_L(x,y,Z) = \int_0^c \rho(x,y,z) \cos 2\pi L/c(z - Z)dz$$

and

$$S_L(x,y,Z) = \int_0^c \rho(x,y,z) \sin 2\pi L/c (z - Z) dz$$

are proposed. Such projections enable all three co-ordinates of atoms to be determined from the date of one layer line L_1 (non-equatorial, $L \neq 0$) and in particular the refinement of the x and y co-ordinates of atoms which overlap in the xy-projection. The method is not applicable only to atoms I and II if:

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SOV/70-3-6-3/25

Usual and Small-circle Weighted Electron Density Projections With Initial Phase Angles

$$z_I/c = z_{II}/c = 1/2 .$$

When the c-axis is perpendicular to a mirror plane phase projections of the type:

$$C_L^{[0,\ c/2]}(x,y,Z) = \int_0^{c/2} \rho\,(x,y,z) \cos \frac{2\pi L}{c}(z - Z)dz,$$

$$S_L^{[0,\ c/2]}(x,y,Z) = \int_0^{c/2} \rho\,(x,y,z) \sin \frac{2\pi L}{c}(z - Z)dz .$$

If c is a 2_1-axis which displaces the centre of symmetry from the mirror plane to c/4 , then the limits of

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integration are c/4 to 3c/4. Formulae are deduced for the small-circle weighted projections of the electron density:

$$C_L^{[0,c/2]}(x,y)\ ,\quad S_L^{[0,c/2]}(x,y)\ ,\quad C_L^{[c/4,3c/4]}(x,y)$$

and $S_L^{[c/4,3c/4]}(x,y)$. To construct them data from three layer lines for rotation about the c-axis are necessary.

$$\sigma_L(x,y) = C_L(x,y) + iS_L(x,y) = \int_0^c \rho\,(x,y,z)\exp\frac{2\pi iLz}{c}\,dz \quad (1).$$

z-co-ordinates can be found from:

Usual and Small-circle Weighted Electron Density Projections With Initial Phase Angles

$$2\pi L z_n/c = \tan^{-1}\frac{S_L(x_n,y_n)}{C_L(x_n,y_n)}\ .$$

Four weighted projections from hkl data for astrakhanite are shown illustrating this determination of γ-co-ordinates of overlapping atoms. These projections weight different layers with z values separated by 1/8 c and are called phasally-weighted projections.
The small-circle projections are constructed (if there is a centre of symmetry and $B_{hkl} = 0$) from:

$$\sigma_L^{[0,c/2]}(x,y) = 1/A_c \sum_h \sum_{k=-\infty}^{\infty}\left[1/2F_{hkL}\cos 2\pi\left(\frac{hx}{a}+\frac{ky}{b}\right) + \right.$$

$$\left. + i\,K_{hkL}\cos 2\pi\left(\frac{hx}{a}+\frac{ky}{b}\right)\right]$$

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SOV/70-3-6-3/25

Usual and Small-circle Weighted Electron Density Projections With Initial Phase Angles

where:

$$K_{hkL} = \frac{2L}{\pi} \sum_{\substack{l=1 \\ L-l=2n+1}}^{\infty} \left(\frac{F_{hk0}}{2L^2} + \frac{F_{hkl}}{L^2-l^2} \right) .$$

In practical computation data from two, or at most, three layer lines are necessary. Illustrations of the expansion of K_{hkL} for various values of L are given. The z-co-ordinates are found from:

$$\frac{2\pi L z_n}{c} = \tan^{-1} \frac{S_L^{[0,c/2]}(x_n, y_n)}{C_1^{[0,c/2]}(x_n, y_n)} .$$

The method can be used for constructing $\left| \sigma_L^{[0,c/2]}(x,y) \right|$.

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SOV/70-3-6-3/25

Usual and Small-circle Weighted Electron Density Projections With Initial Phase Angles

The weighted projections are useful in connection with direct sign-determination methods.
Acknowledgments to N.V. Belov.
There are 2 figures and 19 references, 7 of which are Soviet, 12 English.

ASSOCIATION: Institut kristallografii AN SSSR
(Institute of Crystallography Ac.Sc.USSR)

SUBMITTED: September 17, 1958

Card 6/6

Rumanova, I. M.

AUTHOR: Rumanova, I. M. 20-1-24/58

TITLE: The Crystalline Structure of Astrakhanite (Kristallicheskaya struktura Astrakhanita).

PERIODICAL: Doklady AN SSSR 1958, Vol. 118, Nr 1, pp. 84-87 (USSR)

ABSTRACT: The author describes the investigation of colorless transparent grains the orientation of which was possible by means of Laue diagrams. The author obtained with molybdenum-radiation the radiograms of the rotation around the parameters a,b,c of the monoclinic cell and further more the radiogoniometric developments of the zero-lines and the layer lines around b and c. First of all the author dealt with the projection of the electronic density xy which corresponds to the shortest period c. With 150 reflexes of the hk0 zone the author could determine the signs by means of the statistical method. From the signs of 133 F_{hk0} the projection of the structure was constructed from which, in first approximation, the coordinates x and y of all atoms were determined. An exception was O_4 which in this projection is covered by S. A diagram shows the Fourier (Fur'ye) synthesis with clear peaks of the atoms and with unimportant parasitic peaks. From the here given synthesis all z-coordinates of the atoms were determined

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The Crystalline Structure of Astrakhanite. 20-1-24/58

approximately. The finally selected coordinates of the basic atoms are mentioned in a table. Only the Mg atoms in the symmetry centers (000) and (1/2, 1/2, 0) have no parameters. All other atoms are in the usual positions and the whole structure is characterized by 24 parameters. A diagram shows the projection of the structure of astrakhanite. Every S-atom is in the center of a regular tetra-hedron of oxygen atoms. The octa-hedrons around the Mg are formed by 4 H_2O molecules and two O. Every Na-atom is in an octa-hedron of 4 O and 2 H_2O. The distances occuring in this structure are given. The structure of astrakhanite can be described as a structure of infinite chains of octahedrons of two kinds. The nets formed by the octa-hedrons determine the optical negative character of astrakhanite. There are 2 figures, 1 table, and 7 references, 3 of which are Slavic.

Card 2/3

The Crystalline Structure of Astrakhanite. 20-1-24/58

ASSOCIATION: Laboratory for the Structure of Crystals of the Institute for Crystallography AN USSR (Laboratoriya struktury kristallov Instituta kristallografii Akademii nauk SSSR).

PRESENTED: July 11, 1957, by N. V. Belov, Academician.

SUBMITTED: July 8, 1957

AVAILABLE: Library of Congress

Card 3/3

24(2)

AUTHORS: Rumanova, I. M., Volodina, G. F. SOV/20-123-1-20/56

TITLE: The Crystal Structure of Natrochalcite $NaCu_2(OH)[SO_4]_2 \cdot H_2O = Na[SO_4]_2[Cu_2,OH_2H_2O]$ (Kristallicheskaya struktura natrokhal'tsita $NaCu_2(OH)[SO_4]_2 \cdot H_2O = Na[SO_4]_2[Cu_2,OH_2H_2O]$

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 1, pp 78-81 (USSR)

ABSTRACT: First, various errors committed in earlier paper dealing with this mineral are pointed out. The authors of the present paper investigated crystals found in the Chilean deposit of Chukikamata; by means of molybdenum radiation they took radiograms of the rotation round a, b, c, and made X-ray-goniometric analyses (razvertka) of the contour lines (0, 1, 2) of the rotation round a and b. Besides, the zero-involute of the rotation b was determined by means of Cu-radiation. Reflection intensities were determined by the photographic method of "short films"; this was done visually by means of a blackening scale. The parameters found of the monoclinic cell

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The Crystal Structure of Natrochalcite $NaCu_2(OH)[SO_4]_2 \cdot H_2O = Na[SO_4]_2[Cu_2,OH_2H_2O]$

SOV/20-123-1-20/56

$a = 8.75$ Å, $b = 6.16$ Å, $c = 7.44$ Å, $\beta = 118°40'$ agree well with the data of optical goniometry (Refs 1-3). In the elementary cell ($V = 351$ Å^3) there are two "formula units" $NaCu_2(OH)[SO_4]_2 \cdot H_2O$. According to the analysis of the extinctions, 3 monoclinic spatial groups are possible: C2, Cm and C2/m. The data of optical goniometry (Refs 1-3) and of the measurements of the piezoeffect indicate the existence of a symmetry center. Structure was determined by the method of the heavy nucleus (in the here investigated case Cu). On the radiograms of the rotation round a and b the intensities of the odd contour lines were much weaker than those of the even ones. Therefore, the copper atoms existing in the cell probably make no contribution towards the structural factors of the hkl-reflections with $h = 2n + 1$ ($k = 2n + 1$). First, the projection of the electron density $\delta(x,y)$ was constructed. Besides the given Cu-atoms, other maxima occurred which were identified as S, Na, and O. The majority of atoms was in mirror-like symmetry planes in the quadruple positions(i)(x,0,z).

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SOV/20-123-1-20/56

The Crystal Structure of Natrochalcite $NaCu_2(OH)[SO_4]_2 \cdot H_2O = Na[SO_4]_2[Cu_2,OH_2H_2O]$

The following stage of the investigation comprised the precise determination of the coordinates of the complete model on the basis of the data of "suspended projection". The coordinates of the base-atoms are given in a table. A schematical drawing shows the projection of the structure of natrochalcite on to the xz-plane. Next, the most important interatomic distances in the structure of natrochalcite are enumerated. The distances Cu - O and S - O agree well with their values in other structures. Perfect fissionability in the direction (001) is characteristic of natrochalcite. This property corresponds to the structure found in this case. The positive optical sign of natrochalcite (2V = 36°52') agrees fully with the chains consisting of the heavy Cu-atoms which are parallel to b. The authors thank Academician N. V. Belov for his valuable advice. There are 2 figures, 1 table, and 9 references, 3 of which are Soviet.

ASSOCIATION: Institut kristallografii Akademii nauk SSSR (Institute for Crystallography of the Academy of Sciences, USSR)

PRESENTED: June 20, 1958, by N. V. Belov, Academician
SUBMITTED: June 17, 1958

Card 3/3

RUMANOVA, ISKRA MIKHAYLOVNA

"New Types of Fourier Projections in Crystal Structure Analysis"

A report presented at Symposium of the Interanational Union Conference of Crystallography Lenningrad 21-27 My 1959

SO: B 3,135,471 28 July 1959

SOV/70-4-2-1/36

AUTHOR: Rumanova, I.M.

TITLE: Weighted Zonal Projections of Electron Density in Structure Analysis (Vzveshennyye poyasnyye proyektsii elektronnoy plotnosti v strukturnom analize)

PERIODICAL: Kristallografiyā, 1959, Vol 4, Nr 2, pp 143 - 149 (USSR)

ABSTRACT: Weighted zonal projections are determined by:

$$\int_{z_1}^{z_2} \rho(x,y,z) \, {}^{\sin}_{\cos}\left[2\pi Lz/c\right] dz$$

where L is any real number. From the totality of these projections the class is selected, for which the coefficients of the Fourier series decrease very rapidly with increasing l. For the synthesis of such projections there are sufficient structure amplitudes F_{hkl} in two or three (four as a maximum) layer lines from c-axis Weissenberger photographs, and as these projections are more convenient than the usual zonal projections for which a much greater number of F_{hkl} values are necessary,

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SOV/70-4-2-1/36

Weighted Zonal Projections of Electron Density in Structure Analysis

analogous Patterson functions can be constructed. It is suggested that in actual calculation the separate projections should be made individually for $l \leq 3$ and only at the end superimposed.. The weighting functions Q(z) which appear for various values of z_1 and z_2 for the sine and cosine variants of the initial formulae are discussed. An example is:

$$C_2\{3/8c, 5/8c\}(x,y) = \frac{1}{r A_c} \sum_{h}^{\infty} \sum_{k}^{-\infty} \left(\frac{F_{hk0}}{2} - \frac{F_{hk1}}{1.06} + F_{hk2} - \frac{F_{hk3}}{1.77} + \frac{F_{hk4}}{3} - \frac{F_{hk5}}{7.43} \right) \cos 2\pi \left(\frac{hx}{a} + \frac{ky}{b} \right) .$$

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Weighted Zonal Projections of Electron Density in Structure Analysis

Using this function, it is possible to determine the (x,y) coordinates of an atom which, having a z-coordinate near to c/2, is hidden in the xy projection by two other atoms.

C denotes the cosine variant, S the sine; the suffix is the value of L and the limits z_1 and z_2 are in the square brackets. $S_{0.5}^{[0,c]}$, $S_1^{[0,c/2]}$, $S_1^{[c/2,c]}$, $C_1^{[c/4,3c/4]}$, $C_1^{[-c/4,c/4]}$, $S_{2/3}^{[0,3c/4]}$, $S_{2/3}^{[-3c/4,0]}$ $C_{1.5}^{[c/6,sc/6]}$, $S_{1.5}^{[0,c]}$ are also discussed.

Acknowledgments are made to Academician N.V. Belov. There are 1 figure and 7 references, 2 of which are Soviet, 3 English and 2 international.

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SOV/70-4-2-1/36

Weighted Zonal Projections of Electron Density in Structure Analysis

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography of the Ac.Sc.,USSR)

SUBMITTED: February 10, 1959

Card 4/4

SOV/70-4-4-8/34

AUTHORS: Rumanova, I.M. and Malitskaya, G.I.

TITLE: Refinement of the Structure of Astrakhanite By the Method of Phase Weighted Projections

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 4, pp 510-525 (USSR)

ABSTRACT: A prediction of the structure of $Na_2Mg(SO_4)_2 \cdot 4H_2O$ was made in 1958 but did not agree to much better than 0.27 - 0.19 Å with the structure of Zn-astrakhanite described by Giglio (Ref 4). The structure of the Mg-compound has, therefore, been re-determined. The cell dimensions are $a = 11.03$, $b = 8.14$, $c = 5.49$ Å with $\beta = 100^\circ 40'$, $d_{obs} = 2.25$ g/cm^3 and $Z = 2$. The space group is $P2_1/a = C^5_{2h}$. For the determination 152 F_{hk0}, 245 F_{hkl}, 155 $F_{h0\ell}$, 192 $F_{h1\ell}$ and 180 $F_{h2\ell}$ non-zero reflexions were used. Signs in the F_{hk0} zone were found by Zachariasen's statistical method. 45 were found definitely and all but 17 of the others by the statistical technique. The $\sigma(x, y)$ electron-

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density projection was constructed giving all x,y coordinates, except those of S and O_4 (which are overlapped), fairly well. The 245 hkl reflexions were treated in the same way and the signs of all but 17 were found. The weighted projections:

$$C_1(x,\ y) = \int_0^c \rho\,(x,y,z)\cos\frac{2\pi z}{c}\,dz = \frac{1}{A_c}\sum_{\substack{h\\-\infty}}^{\infty}\sum_{k} F_{hkl}\cos 2\pi(hx + ky)$$

and

$$S_1(x,y) = \int_0^c \rho(x,y,z)\sin\frac{2\pi z}{c}\,dz = -\frac{1}{A_c}\sum_{\substack{h\\-\infty}}^{\infty}\sum_{k} F_{hkl}\sin 2\pi(hx + ky)$$

were constructed giving the z-coordinates by:

$$\frac{2\pi z_j}{c} = \tan^{-1}\left[S_1(x_j, y_j)/C_1(x_j, y_j)\right]$$

except for S and O_4. To find the latter, the phase projections:

$$S_1(x,y,z_s) = \int_0^c \rho(x,y,z)\sin 2\pi/c\ (z - z_s)dz =$$

$$= S_1(x,y)\cos 2\pi z_s/c - C_1(x,y)\sin 2\pi z_s/c \quad \text{and}$$

$$S_1(x,y,z_{O_4}) = \int_0^c \rho(x,y,z)\sin 2\pi/c\,(z - z_{O_4})dz =$$

$$= S_1(x,y)\cos 2\pi z_{O_4}/c - C_1(x,y)\sin 2\pi z_{O_4}/c$$

were calculated. In $S_1(x,y,z_S)$ the S atom disappears and shows O_4 clearly and in $S_1(x,y,z_{O_4})$ the S atom is visible. These projections also gave independent values of the x and y coordinates of the other atoms again. From a new $\sigma(x,y)$ synthesis the remaining signs were found. R_{hk0} for the 152 reflexions was 10.6% without zeros and 13.4% with zeros out to $\sin\theta/\lambda = 0.85$ $Å^{-1}$.

SOV/70-4-4-8/34

Refinement of the Structure of Astrakhanite by the Method of Phase Weighted Projections

The z-coordinates were refined with the $C_2(x,z)$ and $S_2(x,z)$ syntheses. The second layer was chosen to give the best resolution of overlapping. A final $\sigma(x,z)$ projection was calculated with $R_{hol} = 16.0\%$, including zeros out to $\sin\theta/\lambda = 1.0$ Å^{-1}. $S_1(x,y)$ and $C_1(x,y)$ were then repeated, the signs of F_{hkl} being calculated from the best coordinates. For the 245 non-zero F_{hkl} reflections out to 0.88 Å^{-1} R_{hkl} equalled 12.3%. The mean error in the final determination of the O parameters is 0.02 Å. It appears to be due mostly to inaccuracies in the intensity measurements. A drawing of the x-y projection and tables of final co-ordinates are given. The Mg-O octahedra are almost regular and the Na-O octahedra are strongly deformed. The S-O bonds are between 1.45 and 1.49 Å, Na-O between 2.33 and 2.39 Å and Na-H_2O, 2.50 - 2.60 Å.

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SOV/70-4-4-8/34

Refinement of the Structure of Astrakhanite by the Method of Phase Weighted Projections

Acknowledgments are made to Academician N.V. Belov. There are 4 figures, 6 tables and 13 references, of which 7 are Soviet, 1 Rumanian, 1 German and 4 international.

ASSOCIATIONS: Institut kristallografii AN SSSR (Institute of Crystallography of the Ac.Sc., USSR)
Institut neorganicheskoy khimii SO AN SSSR (Institute of Inorganic Chemistry, S.O., Ac.Sc., USSR)

SUBMITTED: February 2, 1959

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24(2)
AUTHORS: Rumanova, I. M., Skipetrova, T. I. SOV/20-124-2-23/71

TITLE: The Crystal Structure of Lawsonite (Kristallicheskaya struktura lavsonita)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 2, pp 324-327 (USSR)

ABSTRACT: Various circumstances, and especially the insufficient accuracy of data hitherto available made a renewed determination of Lawsonite structure appear desirable. By means of MoKα-radiation the authors took the X-ray pictures of the rotation round the rhombic parameters a, b, and c as well as of the arrangement of the layer lines of the rotation round b(0,1,2) and a(0); the intensities of the reflections on them was visually estimated by the method of density marking. The parameters of the elementary cell thus found agree well with earlier results (Refs 1,2): a = 8.83 Å; b = 5.80 Å; c = 13.20 Å. The 3 rhombic space groups Ccm2, Cc2m, and Ccmm are possible. No piezo-effect was, by the way, found.
On the X-ray pictures of rotation round the 3 axes a, b, and c the intensities of the odd layer lines are noticeably weaker than the even ones. Further structural analysis was carried

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out by the statistical method by W. H. Zachariasen (Ref 4). The coordinates found for the basic atoms of Lawsonite structure are given in a table. A schematical drawing shows the projection of Lawsonite structure on to the xz-plane in the coordination polyhedra. The principal architectural motives are the infinite columns on Al-octahedra, which extend in form of double helical lines parallel to b. Each Al-atom occupies the center of an oxygen octahedron. The cavities between the Al-octahedra and diortho-groups are taken up by large Ca-cations round which somewhat distorted $O(H_2O)$-octahedra then form . The latter are connected with one another by neighboring Al-columns. This structure is a good explanation of cleavability in Lawsonite. It is complete along (001) and less complete along (100)(cf. Fig 2). The authors thank Academician N. V. Belov for his valuable advice and R. G. Matveyeva for determining the layer-lines of the rotation round b. There are 2 figures, 1 table, and 6 references, 2 of which are Soviet.

The Crystal Structure of Lawsonite SOV/20-124-2-23/71

ASSOCIATION: Institut kristallografii Akademii nauk SSSR (Institute for Crystallography of the Academy of Sciences, USSR)

PRESENTED: July 24, 1958, by N. V. Belov, Academician

SUBMITTED: July 21, 1958

Card 3/3

KURKUTOVA, Ye.N.; RUMANOVA, I.M.; BELOV, N.V., akademik

Crystalline structure of inderborite

$CaMgB_6O_{11} \cdot 11H_2O = CaMg [B_3O_3(OH)_5]_2 \cdot 6H_2O$.

Dokl. AN SSSR 164 no.1:90-93 S '65. (MIRA 18:9)

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RUMANOVA, I.M.; POPOVA, Ye.P.

Uklonskovite, a new mineral. Kristallografiia 9 no.2:
275-277 Mr-Ap'64. (MIRA 17:5)

1. Institut kristallografii AN SSSR.

RUMANOVA, I. M.; ASHIROV, A.; KURBANOV, Kh. M.

"Application of sign relations to crystal-structure determination of two borate minerals lesserite $Mg[B_3O_3(OH)_5]\cdot 5H_2O$ and probertite $NaCa[B_5O_7(OH)_4]\cdot 3H_2O$."

report submitted for 6th Gen Assembly, Intl Union of Crystallography, Rome, 9 Sep 63.

Inst of Crystallography, AS USSR, Moscow.

RUMANOVA, I.M.; ASHIROV, A.

Determination of the crystalline structure of hydroboracite $CaMg[B_3O_4(OH)_3]_2.3H_2O$. Kristallografiia 8 no.6:828-845 N-D'63.
(MIRA 17:2)

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KURBANOV, Kh.M.; RUMANOVA, I.M.; BELOV, N.V., akademik

Crystalline structure of probertite $CaNa[B_5O_7(OH)_4] \cdot 3H_2O$. Dokl. AN SSSR 152 no.5:1100-1103 0 - '63. (MIRA 16:12)

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Determining the crystalline structure of inderite. Kristallografiia 8 no.4:517-532 Jl-Ag '63. (MIRA 16:9)

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(Inderite crystals)

ASHIROV, A.; RUMANOVA, I.M.; BELOV, N.V., akademik

Crystalline structure of hydroboracite $CaMgB_6O_{11} \cdot 6H_2O$ = $CaMg[B_3O_4(OH)_3]_2 \cdot 3H_2O$. Dokl. AN SSSR 147 no.5:1079-1082 D '62. (MIRA 16:2)

(Hydroboracite crystals)

VOLODINA, G.F.; RUMANOVA, I.M.; BELOV, N.V., akademik

Crystalline structure of cenosite $Ca_2(Y, TR)_2[Si_4O_{12}]CO_3.N_2O$.
Dokl.AN SSSR 149 no.1:173-175 Mr '63. (MIRA 16:2)

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(Cenosite) (X-ray crystallography)

KITAYGORODSKIY, A.I.; VAYNSHTEYN, B.K.; RUMANOVA, I.M.; ZVONKOVA, Z.V.

Theory and practice of direct methods in the structure analysis of crystals. Zhur.strukt.khim. 2 no.5:622-639 S-O '61. (MIRA 14:11)

1. Institut elementoorganicheskikh soyedineniy AN SSSR, Institut kristallografii AN SSSR i Fiziko-khimicheskiy institut imeni L.Ya. Karpova.

(Crystallography)

RUMANOVA, I.M.; VOLODINA, G.F.

Elementary cell and space group of cenosite. Kristallografiia 6 no.6:918 N-D '61. (MIRA 14:12)

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(MIRA 14:12)

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(Praseodymium nitrate)
(Crystallography)

ASHIROV, A.; RUMANOVA, I.M.; BELOV, N.V., akademik

Crystalline structure of lesserite $[Mg[B_3O_3(OH)_5].5H_2O$.
Dokl. AN SSSR 143 no.2:331-334 Mr '62. (MIRA 15:3)

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(Minerals)

RUMANOVA, I.M.

Derivation of formulae for the structural factor from formulae for the generalized projections of electron density. Kristallografiia 6 no.3:465-466 My-Je '61. (MIRA 14:8)

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(Lattice theory) (Electrons)

RUMANOVA, I.M.; NIKOLAYEVA, T.V.

Crystal structure of orthite. Kristallografiia 4 no.6:829-835 N-D '59. (MIRA 14:5)

1. Institut kristallografii AN SSSR i Rostovskiy-na-Donu gosudarstvenny universitet.

(Allanite)

RUMANOVA, I.M.

Formulas for the suspended projections of electron density for plane oblique-angled and orthogonal black and white groups having a center of symmetry or antisymmetry. Kristallografiia 5 no. 6:831-863 N-D '60. (MIRA 13:12)

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(Crystallography, Mathematical) (Electrons)

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False symmetry in the structure of lawsonite. Kristallografiia 5 no.2:215-217 Mr-Ap '60. (MIRA 13:9)

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